HEIGHT OF THE ATMOSPHERE DETERMINED FROM THE TIME OF DISAPPEARANCE OF BLUE COLOR OF THE SKY AFTER SUNSET.

By T. J. J. SEE. [Reprinted from Nature, October 1, 1903, p. 526.]

The extreme height of our atmosphere has been determined heretofore from the observation of meteors, which begin to glow when the friction becomes sufficiently intense to vaporize the materials of which they are composed. This method is very satisfactory from most points of view, and will perhaps continue to be used by astronomers. Nevertheless, I think it worth while to direct attention to another method, which is more simple, and which, I believe, will be found equally accurate. It consists in observing with the naked eye the gradual disappearance of the *blue* color of the sky as darkness comes on. It is surprising how accurate a person of good sight can make this observation when the atmosphere is perfectly clear. The time of sunset should be noted, and the time of the last sensible blue of the sky. With the data in the Nautical Almanac a simple computation by spherical trigonometry gives the depression of the sun at the instant the blue fades out into black, and we at once calculate the height of the illuminated particles overhead. The following are the results of some observations taken by the writer at Annapolis, Md.:

1903.	Height.	Remarks.
August 10	125 miles	A trace of blue remaining.
August 21	130 miles	Blue just vanishing.
August 22	133 miles	Sky just black.
August 23	135 miles	Blue has disappeared.
August 24	132 miles	Blue vanishing.
	Average 131 miles.	

The uncertainty of this value will probably be between five and ten miles.

The instant the blue disappears from the sky is a little indefinite, owing to the gradual thinning out of particles in the upper air sufficiently dense to reflect blue light which can be seen by the eye against a black night sky, but I have not found this indefiniteness so great as might be expected. It does not seem to lead to greater uncertainty in the height of the atmosphere than the method depending on meteors. * * *

According to Lord Rayleigh's theory the blue color of the sky is due to reflection of sunlight from minute particles of oxygen and nitrogen in the upper layers of our atmosphere. This theory receives its most striking confirmation from the long duration of the blue color after sunset, showing the great height of the particles which scatter the blue light. There can, I think, be very little doubt that our atmosphere extends to a height of about 130 miles.

The editor is pleased to be able to add that Professor See promises to communicate to the readers of the REVIEW, in the early future, the observations and the formulae on which the preceding article is based, so that other observers may be induced to make similar observations. From many observations, made in very different portions of the earth, a general result may be obtained that will be of considerable importance to meteorology.—*C. A.*

PILOT BALLOONS AND THE UPPER WINDS.

By F. O. HILLS. Dated Torrington, Conn., September 22, 1906.

At a church festival held September 21 in this place, a paper balloon was sent up [at about 8 p. m.]. It rose apparently to the height of a mile, going straight up, veering a very little toward the south. When it had reached its highest point, or nearly so, it started to move directly westward, and in a few minutes was out of sight. There was not a cloud in sight, and the sky remained cloudless until 10 p. m. But early next morning (September 22) the wind was blowing strong from the east, and by 8 a. m. it was raining quite hard. Evidently that balloon was in the path of this storm, altho there was no sign of a storm when it was sent up.

By reference to the morning map of Friday, September 21, it is seen that at that time westerly winds prevailed over Connecticut, as a part of the circulation around a low that was central east of Cape Cod. During the rest of that day, while this low disappeared, another one developed over the Lake region, so that on the morning of Saturday, the 22d, southeast winds prevailed along the coast from New Jersey to Maine. Of course in the interval between these two maps, during the shift of the winds from northwest to southeast, there must have been a period of calm, during which the balloon happened to be sent up. We doubt whether it could have gone as high as one mile, but it is certainly interesting to find that the easterly wind had begun at some high altitude, and that the influence of the low in the Lake region was felt high above us before it was felt at the surface of the ground. Of course observations of the motions of clouds would tell us something of the motions of the upper air; but clouds form principally in ascending air, and a cloudless blue sky is an almost infallible indication of the general presence of descending air. We may, therefore, conclude that, in the present case, a slowly descending easterly wind prevailed high above the calm air of Torrington during the evening of September 21; of course by the time that this air had attained the cloudy area around the low pressure it had become an ascending wind, and was itself cloudy and rainy. Inasmuch as manned balloons and sounding balloons can only rarely be sent up, while the small hot-air and the toy balloons are very common, it would be well for observers to record every case that comes to their attention similar to this observation at Torrington. Of course it is known that, as a general rule, when the sun warms up the lower air in the morning and it ascends, the upper air descends, bringing with it the wind of the upper regions; so that all day long the wind at the earth's surface has a close connection with that prevailing thruout the whole region thru which the vertical exchange takes place; but when the lower winds cease at nighttime, and no vertical exchange takes place, then the upper winds are quite unknown to us, except by the observation of balloons and clouds. In general, whenever calm prevails near the ground it is particularly desirable to know the drift of the upper air, as shown by the balloon.—EDITOR.

PROFESSOR ADOLF ERMAN.[1]

By WILHELM ERMAN.

[Translated from Berliner National-Zeitung, July 14, 1877.]

Prof. Adolf Erman was called away on the 12th of this

[1] In the Astronomische Nachrichten for 1868, pp. 369-378, there was published a mathematical paper by Prof. Adolf Erman, on the general circulation of the atmosphere, that is but little known to modern meteorologists. Its train of thought is so exactly parallel to that of the papers published by Ferrel in 1858-60 that I have always supposed it to have been suggested by reading either the original memoir of Ferrel or possibly some short abstract. Erman has been most widely known for his work in terrestrial magnetism, but he was first known in early life by reason of his exploration of the meteorological and magnetic phenomena in Russia and Siberia. This mathematical paper of 1868 reveals him, however, as an expert mathematician, applying his knowledge to the most difficult problem of meteorology. In order that we may do justice to the history of the development of meteorology, we take pleasure in preserving the memory of one about whose personal life but little seems to be known by publishing a translation of a biographical note, written by his son Wilhelm, which appeared in the Berlin National Zeitung on the 14th of July, 1877. Dr. Wilhelm Erman is now Director of the Royal and University Library at Breslau. He states that his father lectured on the subject of the earth's atmosphere in his university lectures at Berlin, from the year 1832 onward. Possibly the article in the Astronomische Nachrichten was included among these lectures, and we hope at some time to publish it in full in a second volume of translations bearing on the mechanics of the earth's atmosphere.—*C. A.*